Chapter 1: Scientific Research

Definition

For some reason, probably related to a dislike for math, many people consider the word ***research*** and everything the word suggests as unpleasant. But **research** can be a valuable term. It can lead to uncovering the answers to "**impossible**" questions.

Two basic questions the beginning researcher must learn to answer are *how* and *when to* use research methods and statistical procedures. Developing methods and procedures are 3 valuable tasks, but the focus for the majority of research students should be on applications.

Although both statisticians and researchers are fundamental in producing research results, their specialties are different (keep in mind that one person may serve in both capacities). Statisticians generate statistical procedures or formulas called algorithms; researchers use these algorithms to investigate research questions and hypotheses. The results of this cooperative effort are used to advance our understanding of the studied phenomenon.

Scientific research may be defined as a systematic, controlled, empirical, and critical investigation of hypothetical propositions about the presumed relations among observed phenomena. This definition contains the basic terms necessary in defining the method of scientific research, and describes a procedure that has been accepted for centuries.

However, regardless of its origin, all research begins with a basic question or proposition about a specific phenomenon. For example: Why do viewers select one television program over another? What sections of the newspaper do people read most often? What types of magazine covers attract the widest number of readers? Which types of advertising are most effective in selling specific types of products? Each of these questions could be answered to some degree with a well-designed research study. The difficulty, in many cases, is to determine which type of study, or which method of collecting data, is most appropriate to answer the specific question(s).

The user of the method of tenacity follows the logic that something is true because it has always been true. An example is the store owner who says, "I don't advertise because my parents did not believe in advertising." The basic idea is that nothing changes; what was good, bad, or successful before will continue to be so in the future.

In the method of intuition, the a priori approach, one assumes that

something is true because it is "self-evident" or "stands to reason." Researchers who conduct telephone research encounter this method of knowing frequently. Many respondents assume (intuition) that all research projects involve some form of sales. This "fear," along with various consumer groups that wish to ban all forms of telephone contacts for sales, research, or solicitation, may be the downfall of telephone research in the near future.

The method of authority seeks to promote belief in something because a trusted source, such as a relative, news correspondent, or teacher, says it is true. The emphasis is on the source, not on the methods the source may have used to gain the information. The claim that "The world is going to end tomorrow because the New York Times editorial said so" is based on the method of authority.

The scientific method approaches learning as a series of small steps. That is, one study or one source provides only an *indication* of what may or may not be true; the "truth" is found only through a series of objective analyses. This means that the scientific method is self-correcting in that changes in thought or theory are appropriate when errors in previous research are uncovered.

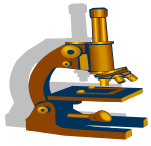
For example, scientists changed their ideas about the planets Saturn, Uranus, and Neptune when, on the basis of information gathered by the Voyager spacecraft, they uncovered errors in earlier observations. In communications, researchers discovered that the early perceptions of the power of the media (the "hypodermic needle" theory) were incorrect and, after numerous research studies, concluded that behavior and ideas are changed by a combination of communication sources and that people may react to the same message in different ways.

The scientific method may be inappropriate many areas of life, such as evaluating works of art, choosing a religion, or forming friendships, but the method has been valuable in producing accurate and useful data in mass media research. The following section provides a more detailed look at this method of knowing.

Characteristics of the Scientific Method

1.1 Characteristics of the Scientific Method

Five basic characteristics, or tenets, distinguish the scientific method from other methods of knowing. A research approach that does not follow these tenets cannot be considered to be a scientific approach.



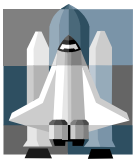
1. Scientific research is public

1. Scientific research is public: Scientific advancement depends on freely available information. A researcher, especially in the academic sector, cannot plead private knowledge, methods, or data in arguing for the accuracy of his or her findings; scientific research information must be freely communicated from one researcher to another.

Researchers, therefore, must take great care in published reports to include information on their use of sampling methods, measurements, and data-gathering procedures. Such information allows other researchers to verify independently a given study and to support or refute the initial research findings. This process of replication, discussed in greater detail in Chapter 2, allows for correction or verification of previous research findings.

Researchers also need to save their descriptions of observations (data) and their research materials so that information not included in a formal report can be made available to other researchers on request. *It is common practice to keep all raw research material for 5 years. This material is usually provided free as a courtesy to other researchers or for a nominal fee if photocopying or additional materials are required.*

2. Science is objective



2. Science is objective: Science tries to rule out eccentricities of judgment by researchers. When a study is undertaken, explicit rules and procedures are constructed and the researcher is bound to follow them, letting the chips fall where they may. Rules for classifying behavior are used so that two or more independent observers can classify particular patterns of behavior in the same manner. For example, if the attractiveness of a television commercial is being measured, researchers might count the number of times a viewer switches channels while the commercial is shown. This is considered to be an objective measure because a change in channel would be reported by any competent observer. Conversely, to measure attractiveness by observing how many people make negative facial expressions while the ad is shown would be a subjective approach, since observers may have different ideas of what constitutes a negative expression. However, an explicit definition of the term *negative facial expression* might eliminate the coding error.

Objectivity also requires that scientific research deal with facts rather than interpretations of facts. Science rejects its own authorities if their statements are in conflict with direct observation.

3. Science is empirical

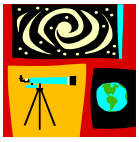
3. Science is empirical**:** *Researchers are concerned with a world that is knowable and potentially measurable. (Empiricism is derived from the Greek word for "experience"). They must be able to perceive and classify what they study and to reject metaphysical and nonsensical explanations of events. For example, a newspaper publisher's claim that declining subscription rates are "God's will" would be rejected by scientists — such a statement cannot be perceived, classified, or measured.*

This does not mean that scientists evade abstract ideas and notions — they encounter them every day. But they recognize that concepts must be strictly defined to allow for observation and measurement.

Scientists must link abstract concepts to the empirical world through observations, which may be observed either directly or indirectly via various measurement instruments. Typically this linkage is accomplished by framing an operational definition.

Operational definitions are important in science, and a brief introduction necessitates some backtracking. There are basically two kinds of definitions. A constitutive definition defines a word by substituting other words or concepts for it. For example, "An artichoke is a green leafy vegetable, a tall composite herb of the *Cynara scolymus* family" is a constitutive definition of the concept "artichoke". In contrast, an operational definition specifies procedures to be followed in experiencing or measuring a concept. For example, "Go to the grocery store and find the produce aisle. Look for a sign that says Artichokes. What's underneath the sign is one." Although an operational definition assures precision, it does not guarantee validity. An errant stock clerk may mistakenly stack lettuce under the artichoke sign and fool someone. This underlines the importance of considering both the constitutive and the operational definition of a concept in evaluating the trustworthiness of any measurement. A careful examination of the constitutive definition of artichoke would indicate that the operational definition might be faulty.

4. Science is systematic and cumulative



4. Science is systematic and cumulative: *No single research study stands alone, nor does it rise or fall by itself. Astute researchers always utilize previous studies as building blocks for their own work. One of the first steps taken in conducting research is to review the available scientific literature on the topic so that the current study will draw on the heritage of past research (Chapter 2).* This review is valuable for identifying problem areas and important factors that might be relevant to the current study (see Cat-tell, 1966).

In addition, scientists attempt to search for order and consistency among their findings. In its ideal form, scientific research begins with a single, carefully observed event and progresses ultimately to the formulation of theories and laws. A theory is a set of related propositions that presents a systematic view of phenomena by specifying relationships among concepts. Researchers develop theories by searching for patterns of uniformity to explain the data that have been collected. When relationships among variables are invariant under given conditions; that is, when the relationship is always the same, researchers may formulate a law. Both theories and laws help researchers search for and explain consistency in behavior, situations, and phenomena.

Science is predictive. Science is concerned with relating the present to the future. *In fact, scientists strive to develop theories because, for one reason, they are useful in predicting behavior. A theory's adequacy lies in its ability to predict a phenomenon or event*

successfully. If a theory suggests predictions that are not borne out by data analysis, that theory must be carefully reexamined and perhaps discarded. Conversely, if a theory generates predictions that are supported by the data, that theory can be used to make predictions in other situations.

Research Procedures

1.2 Research Procedures

The use of the scientific method of research is intended to provide an objective, unbiased evaluation of data. To investigate research questions and hypotheses systematically, both academic and private sector researchers follow a basic eight-step developmental chain of procedures. However, merely following the eight research steps *does not guarantee* that the research is good, valid, reliable or useful. An almost countless number of intervening variables (influences) can destroy even the most well-planned research project. It's similar to someone assuming he or she can bake a cake just by following the recipe. The cake may be ruined by an oven that doesn't work properly, spoiled ingredients, high or low altitude, or numerous other problems.

The typical eight-step research process includes:

1. *Select a problem.*
2. *Review existing research and theory (when relevant).*
3. *Develop hypotheses or research questions.*
4. *Determine an appropriate methodology/research design.*
5. *Collect relevant data.*
6. *Analyze and interpret the results.*
7. *Present the results in appropriate form.*
8. *Replicate the study (when necessary).*

Step 4 includes the decision of whether to use qualitative research (such as focus groups or one-on-one interviews using small samples) or a quantitative research (such as telephone interviews) where large samples are used to allow results to be generalized to the general population under study.

Steps 2 and 8 are optional in private sector research because in many instances research is conducted to answer a specific and unique question related to a future decision, such as whether to invest a large sum of money in a developing medium. In this type of project, generally, there is no previous research to consult, and there seldom is a reason to replicate (repeat) the study because a decision will be made on the basis of the first analysis. However, if the research provided inconclusive results, the study would be revised and replicated.

Each step in the eight-step research process depends on all the others to help produce a maximally efficient research study.

Before a literature search is possible, a clearly stated research problem is required; to design the most efficient method of investigating a problem, the researcher needs to know what types of studies have been conducted, and so on. All the steps are interactive: the results or conclusions of any step have a bearing on other steps. For example, a literature search may refine and even alter the initial research problem; a study conducted previously by another company or business in the private sector might have similar effects.

1.3 Sectors of Research: Academic and Private

Sectors of Research: Academic and Private

The practice of research is divided into two major sectors: academic and private. Academic and private research are sometimes referred to as "basic" and "applied" research. *However, these terms are not used in this text since research in both sectors can be basic and/or applied. Both sectors of research are equally important, and in many cases the two work together to solve mass media problems.*

Academic sector research is conducted by scholars from colleges and universities. It also *generally* means that the research has a *theoretical* or scholarly approach; that is, the results are intended to help explain the mass media and their effects on individuals. Some popular research topics in the theoretical area include the use of the media and various media-related items, such as video games, teletext, and multiple-channel cable systems; lifestyle analyses of consumers; media "overload" on consumers; alternatives to present media systems; and the effects of various types of programming on children.

Private sector research is conducted by nongovernmental businesses and industries or their research consultants. It is generally *applied research;* that is, the results are intended to be used in decision-making situations. Typical research topics in the private sector include analyses of media content and consumer preferences, acquisition research to determine whether to purchase additional businesses or facilities, public relations approaches to solve specific informational problems, sales forecasting, and image studies of the properties owned by the company.

There are other differences between academic and private sector research. *For instance, academic research is public.* Any other researcher or research organization that wishes to use the information gathered by academic researchers should be able to do so merely by asking the original researcher for the raw data. Most private sector research, on the other hand, generates proprietary data: the results are considered to be the sole property of the sponsoring agency and cannot generally be obtained by other researchers. Some private sector research, however, is released to

the public soon after it has been conducted, such as opinion polls and projections of the future of the media; still other data are released after several years, although this practice is the exception rather than the rule.

Another difference between academic and private sector research involves the amount of time allowed to conduct the work. Academic researchers generally do not have specific deadlines for their research projects (except when research grants are received). *Academicians usually conduct research at a pace that accommodates their teaching schedules. Private sector researchers, however, nearly always operate under some type of deadline.* The time frame may be specified by management or by an outside agency that requires a decision from the company or business. *Private sector researchers rarely have an opportunity to pursue research questions in a casual manner; a decision is generally waiting to be made on the basis of the research.*

Also, academic research is *generally* less expensive to conduct than research in the private sector. This is not to say that academic research is "cheap" — it is not in many cases. But academicians do not need to have enormous sums of money to cover overhead costs for office rent, equipment, facilities, computer analysis, subcontractors, and personnel. Private sector research, whether it is done within a company or hired out to a research supplier, must take such expenses into account. The reduced cost is the primary reason why many of the large media companies and groups prefer to use academic researchers rather than professional research firms.
Despite these differences, it is important for beginning researchers to understand that academic research and private sector research are not completely independent of each other. **The link between the two areas is important.** *Academicians perform many studies for the industry, and private sector groups conduct research that can be classified as theoretical* (for example, the television networks have departments that conduct social research). Many college and university professors act as consultants to, and often conduct private sector research for, the media industry.

It is also important for all researchers to refrain from attaching to academic or private sector research such stereotypical labels as "unrealistic," "inappropriate," "pedantic," and "limited in scope." Research in both sectors, although differing occasionally in terms of cost and scope, uses similar methodologies and statistical analyses. In addition, both sectors have common research goals: to understand problems and to predict the future.

In conducting a study according to the scientific method, researchers need to have a clear understanding of what they are investigating, how the phenomenon can be measured or observed, and what procedures are required to test the

observations or measurements. Conceptualization of the research problem in question and a logical development of procedural steps are necessary to have any hope of answering a research question or hypothesis.